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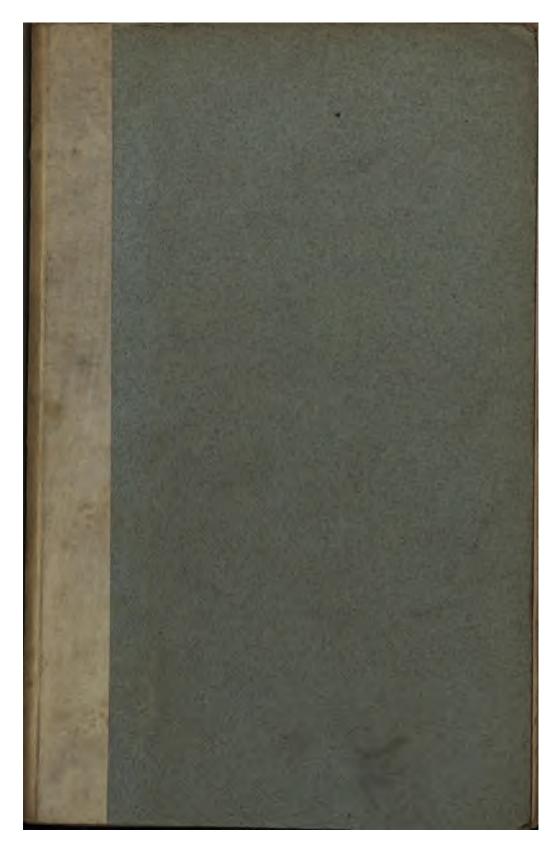
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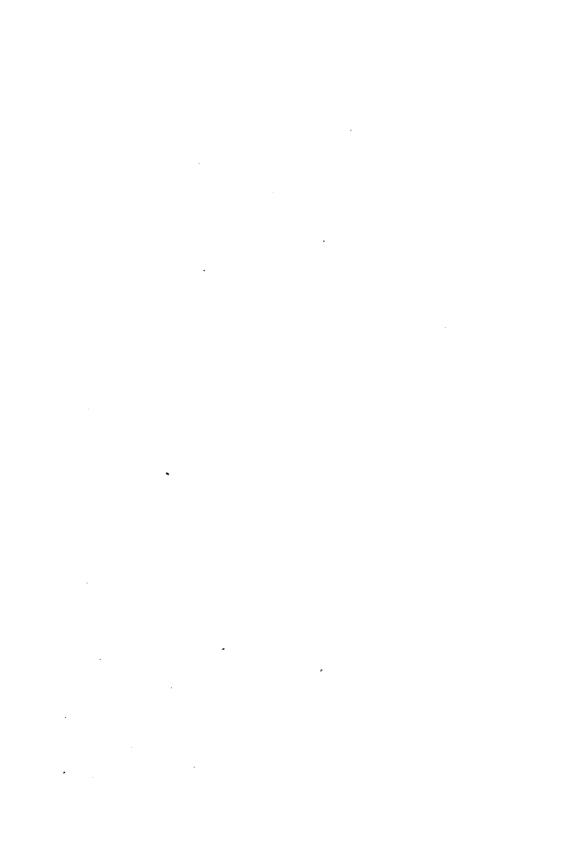
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#### THE

## MODERN ORGAN

A CONSIDERATION OF THE PREVALENT THEORETICAL AND PRACTICAL DEFECTS IN ITS CONSTRUCTION,

WITH

PLANS AND SUGGESTIONS FOR THEIR REMOVAL.

Aully Ellustrated.

BY

THOMAS CASSON,

DENBIGH.

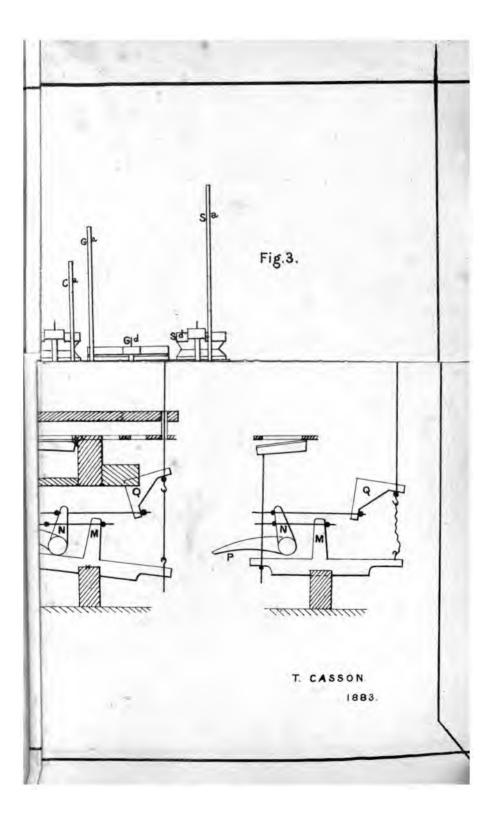
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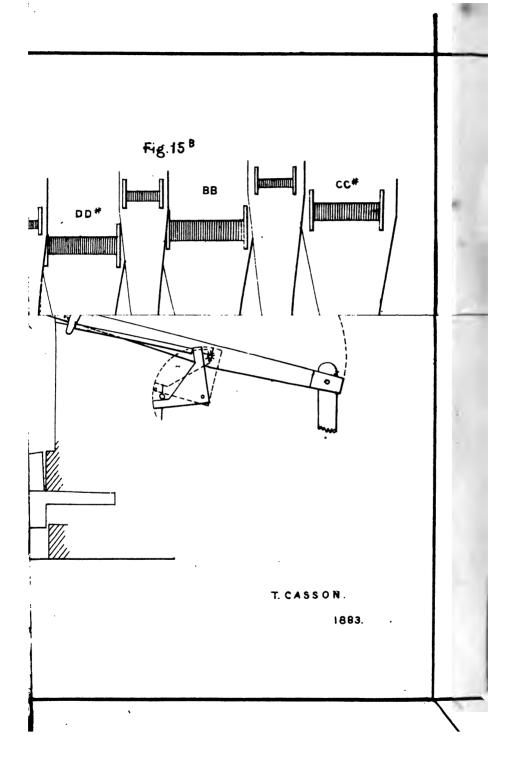
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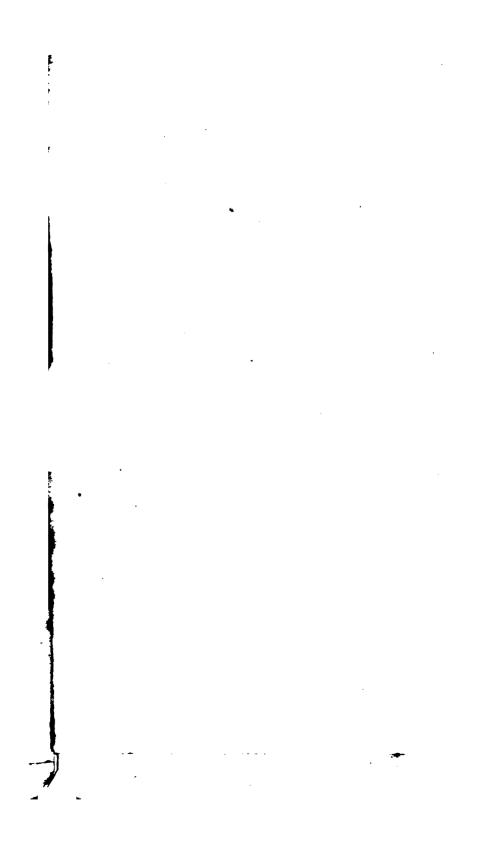
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THOMAS CASSON,

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1883.

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### W. T. BEST, Esq.,

WITH PROFOUND RESPECT FOR HIS RANK AS

#### A MUSICIAN,

NO LESS THAN WITH ADMIRATION FOR HIS LOYALTY TO THE

#### KING OF INSTRUMENTS:

AND WITH SINCERE THANKS FOR THE COURTESY AND ENCOURAGEMENT WHICH HE HAS EXTENDED TO THE AUTHOR,

This little Mork is dedicated.

.

•

•

#### PREFACE.

It is evident to all musicians that the universal adoption in this country of the C C organ, in lieu of the old longmanual, has been by no means of unmixed benefit to art. This has arisen from the adoption of the C C compass, rather than of the C C principle. That the principle is right is unquestionable—the completeness and convenience of a thoroughly developed C C organ placing it in advance of all others: but this completeness of development is hardly ever met with. The pecuniary saving effected by shortening the manual compass has generally been devoted to mere multiplication of manual stops: the pedal organ, the completeness and efficiency of which is the glory of the C C principle, being left without any adequate provision, and made to consist of a few stops, of greatly enlarged scale and very hard blown, in order to produce the maximum of noise for the minimum of money. Let any musician recall the sweet mellow basses of Green's Organs-now, alas, ruthlessly swept away—and contrast them with the noisy turbulence of the ordinary pedal organ, and consider whether music has altogether gained by this substitution. It is not too much to say that, as a rule, the modern English builder has taken away the bass of the long-manual organ without furnishing any equivalent.

Dismissing from consideration so much of this fault (say two thirds) as arises from the abject surrender of artistic principle to the avarice of buyers and sellers, and the incompetence of performers, it will be the most useful task that we

can undertake, if we analyse its causes in cases in which avarice and incompetence are no factors. That there are such cases is manifest from the existence of organs deficient in pedal stops in cases where liberality and proficiency are beyond question.

Without imputation of avarice, it is quite comprehensible that in the prevailing race for more size of manual-stop specification (the *ignis fatuus* of organists, builders, and 'organ committees') the cost of a properly proportioned pedal organ may well cause some alarm: but it is not my object to assist any one in obtaining a large organ for the price of a small one, nor indeed necessarily to assist in getting large organs at all. My object is to design duly proportioned instruments, for which funds must suffice if they suffice for large organs.

Probably the most serious artistic difficulty in the adoption of an adequate pedal organ arises from the fact that no system of control has yet been devised for it. The worry of the constant change of stops and couplers, at every change of manual or manual power, may well deter even the most dexterous performer from having any stop inserted without which he can make shift. German precedents are of no value; for, however correct the Germans may be in their theories, their pedantic music and archaic mechanism place them without the pale of modern art. Nor will the suggestions of the College of Organists help to a true solution of the difficulty, however useful they may be until something better be devised. The true solution is to be found in basing a system of control upon a sound theory. Fortunately, nothing more is required than to follow up the German theory to its legitimate conclusion. This I have attempted in CHAPTER I.

With one notable exception, see p. 9

CHAPTER II. is an attempt to systematize and unite the advantages of the various methods of combination now in use.

CHAPTER III. offers suggestions for a considerable saving in cost, where an adequate pedal organ is desired.

I wish especially to emphasize the difference between matters of principle and matters of detail. It is a matter of detail whether or not the suggestions of Chapters II. and III. be adopted; but it is a matter of principle that basses shall be provided on the pedal for each chief manual stop, that these basses shall be grouped into separate pedal organs, and that whatever method of combination be adopted, it shall act simultaneously upon each manual, and its special pedal organ and couplers.

I may add that I have one enthusiastic disciple in a good builder of well-known name, and that I can now get organs built on this system.

THE AUTHOR.

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#### CHAPTER I.

#### PEDAL BASSES.

Assuming that the German C C theory be adopted, it is unjust not to carry it out fully. The essential principle of that theory is, that the pedal organ shall be provided with basses for the chief manual stops. This is done by the Germans to the extent of providing the stops; but owing to their pedantic method of playing (their stops being generally 'set' beforehand) this mere fulfilment of the letter of their theory is practically useless in other countries, where ever-varying tones are demanded during performance: owing, nevertheless, to universal lack of system, no method of control has ever been applied to the pedal stops. Thus the pedal organ is either monotonous and inappropriate from lack of stops, or out of control from lack of system—the stops forming a forest of unwieldy handles, demanding perpetual manipulation at the very times when the hands and feet can be least spared.

If, however, the spirit of the German theory be fully adopted, it will be perceived that not only should the pedal basses represent their manual counterparts individually, but that they should be grouped to form separate pedal organs to represent their manual counterparts collectively. This is made clear in some modern German instances, where this theory has been carried out to some extent with the awkward expedient of two pedal organs with separate pedal claviers.<sup>a</sup>

It is impossible to have more than one convenient pedal clavier. Two must be cramped and clumsy; and since three

<sup>\*</sup>Messrs. WALCKER & Co. inform me (27th February, 1883), that they now group their pedal stops into separate pedal organs, attachable by pedals to one clavier; the action simultaneously throwing off the pedal organs not required. This is on the same theory as mine, and confirms it. Their action does not, however, work the pedal couplers, and would be of comparatively little use in English organs.

or more are quite impracticable, the theory cannot be completely carried out in this fashion. Separate parts, as between two pedal organs, are however neither written nor required. All that is necessary is that a separate pedal organ be provided for each manual, with means for instantly attaching it to one pedal clavier, to the simultaneous exclusion of the pedal organs not required; together with means for working the manual-to-pedal couplers simultaneously and appropriately.

By this means we give to the pedal stops all the accessibility and variety hitherto peculiar to the manual stops; and if the combination action be arranged to act upon each manual organ simultaneously with its pedal organ and coupler, it is obvious that either by the combination action, or draw stop arrangement, the attachment of any pedal organ to the pedal clavier may be made in all cases to provide instantaneously the exact pedal bass required.

It is not intended that, in playing, the bass combination shall necessarily be the exact counterpart of that of the manual. On the contrary, the separate pedal organs enable the organist to use contrasting or solo pedal combinations in exactly the same way as he uses those of the manuals, of course far more readily than is possible by any present method. The pedal clavier becomes in fact a great hand, which may be applied at will to any of the pedal organs.

In answer to the objection that the pedal organ should have special weight and character, I would point to the '37 stop's organ in the appendix as disposing of both questions. It is not denied that at the will of the performer the pedal organ should be capable of producing tones of special character or weight; but it is maintained that the organist alone should have the option of either making it do so, or of producing an unobtrusive and strictly appropriate bass. The present prevalent English method does not provide a reasonably good bass, either by way of match or contrast, to any manual combination whatever—except so far as the contrast may exist between music on the one hand and noise on the other; and it especially ignores the neces-

a'i.c., 24 stops and 13 pedal basses.

sity for basses for the Swell and Choir. If organists were, as they invariably should be, placed where they could hear their instruments, the noisy, monotonous, inappropriate 'pedal organ' would not long survive.

Even were the invariable relatively obstreperous individuality of the pedal bass correct in theory however, we are still without any system of control. It is worthless, from an artistic point of view, to have contrivances for 'reducing the pedal organ to a soft 16 ft. tone,' bringing on and off the 'Great to Pedal' coupler, &c. There must, in the organ of the future, be means for instantaneously reducing or augmenting the pedal organ to exactly the bass required, whether the stop be a Stopped Bass 16 ft., Violoncello 8 ft., Bassoon 16 ft., Clarionet 4 ft., or what not; while, as to the couplers, the 'Swell to Pedal' and 'Choir to Pedal' are of quite as much importance as the 'Great to Pedal'not of course as a mere question of silencing so much noise, but as a question of producing certain musical sounds: yet no provision is made for the control of these useful adjuncts. I do not say that a method of control, other than that of the separate pedal organs, may not be devised hereafter; but up to the present time it has not been produced. If the separate pedal organ system be adopted, even for pipes of enlarged scale, they must be grouped; and if so, they must be grouped in the order that long experience has shown to be necessary in the manual departments, viz.:—

> Full and ponderous. Light accompanimental. Expressive. Orchestral.

This brings us to where we were before—giving us again pedal basses for the Great, Choir, Swell, and Solo Organs.

Another objection to the German theory that the pedal organ should consist of basses for the manual stops is, that if it were correct, the object could be better attained by abolishing the pedal organ altogether, elongating the manual organs to C C C, and providing couplers in 16 and 8 ft. pitch for each manual. This was, I think, a plan advocated by the late Mr. Turle, and other eminent English

musicians. It is infinitely to their credit; forthere can be no doubt that if thoroughly carried out, it would have been immeasurably superior to the C C organ, as generally con-Unfortunately it was but a plan, however: it was structed. never completely carried out-probably on account of its great cost, for it would have necessitated carrying all the stops through to the C C C key, in order to avoid breaks at C C, such as are still perpetrated at tenor C by even eminent English builders. Still more unfortunately, it would have been prohibitory of contrasting obbligato or solo passages for the pedals; for these could not have been obtained without altering the combinations of other manuals to obtain them—an altogether impracticable idea. The six couplers too would have been out of control. The College of Organists, by their suggestions of elaborate contrivances for the control of only one pedal coupler, more than prove this. The chief objection, however, is, that contrasting obbligato and solo passages would be unattainable. The suggestion of the College of Organists as to pedal stops for melodic use is by far the most artistic and valuable of any in their scheme: but I know of no quarter, save this, in which it has received the slightest attention. The fact is, that pedal solo stops are of no more use without separate pedal organs, in which to group them and make them available, than solo stops for the manual would be without separate manual organs.

By way of contrast, let the musician figure to himself an organ in which an appropriate and sufficient, but unobtrusive bass is provided by touching a pneumatic stud, the bass of the Swell rising and falling with its manual power, the Choir endowed with sweet soft basses, Pedal contrasting obbligate and solo effects at once accessible, immediate antiphonal response of pedal, as well as of manual, obtained in divided organs, all worry with the pedal organ and pedal-couplers absolutely abolished. He can then judge for himself as to the merits of the system.

Divested of some technical phraseology, the following is a description of the method of working pedal organs under my patent. Fig. 1 shows a sketch of a portion of the action of a tracker-work organ of two manuals, S and G. Each manual has an independent pedal organ brought into action by ventils controlled by the pedals Sa and Ga through the ventil trackers Se and Ge. These pedals, Sa and Ga, I call Pedallier Helps. It will be seen that on each of them there is a catch, Sd and Gd, so arranged that when one Help is depressed, it will at once be seized and held by one of the spring detents, Sb or Gb. These detents are fixed on one shaft, and work together, so that either Help, in being depressed, will force back both detents, and release the other. Thus, one pedal organ is brought on and the other thrown off, by one movement of one pedal.

Gj and Sj are the ordinary pedal couplers, worked in the ordinary way. They do not, however, couple to the pedal clavier, but, in this case, to intermediate sets of back-falls, Sf and Gf. These intermediate back-falls work from the pedal stickers h. h. h., and come into or out of action by their frames being depressed by their respective helps. Thus, although the ordinary couplers be drawn, they will not work unless their respective helps be also depressed. In the figure, both couplers are supposed to be drawn, but Sj fails to work because Sf is not depressed. Gj, being fully connected, works.

K is a diagonal back-fall, of which the centre is depressed by the coupler Swell to Great. When the 'Swell to Great' is drawn, and the Help Ga depressed, both pedal organs and such pedal couplers as are drawn will come on. If however Sa be depressed under the same conditions, the pedal organ and couplers of Ga will be thrown off; thus exactly corresponding with the manual actions when the 'Swell to Great' is drawn, whereby the 'Great' manual plays both organs, though the 'Swell' plays only one.

It is not necessary to have the intermediate back-falls; but they do well for illustration, and would, I think, be better for purposes of regulation. It would suffice to have the ordinary pedal coupling back-falls so arranged that the pedallier helps and ordinary coupling actions must concur in the coupling before it can take place:—a very simple matter.

Thus, one touch of a pedal brings into action its pedal organ, and, if drawn, its pedal coupler, throwing off the other. If preferred, the coupling of the pedal organs together could be effected by a movement separate from that of the manual coupler.

Of course pneumatic studs could be substituted for the pedals Ga and Sa, and would then constitute the 'Pedallier Helps.'

Each pedal organ, together with its intermediate coupling movement, I term a 'Pedallier.'

Fig. 2 is a perspective diagram, illustrating the arrangement as applied to an organ having 3 manuals with pneumatic tubular vacuum action. Figs. 3 and 4 being respectively an elevation and section of the wind-chests and valves employed. I will suppose that there are 3 manuals, G. C. and S., and that the Pedallier Helps are in the form of studs (one under each manual), which can be pushed to bring their appropriate pedalliers into action, and returned by a spring. Connected with these studs by any convenient mechanism are 3 stickers, Ga, Ca, and Sa, each of which when depressed will open a small valve Gb Cb, or Sb, to a corresponding pneumatic lever Gd, Cd, or Sd, which thereupon, by depressing the sticker Gf, Cf, or Sf, will open the main valve Ge, Ce, or Se. On the stickers Gf, Cf, and Sf, are catches which engage with the spring detents Gq. Cg, and Sg, as explained in reference to Fig. 1; so that each Pedallier Help, in bringing its own pedallier into action, releases the others. Any two of the pedallier actions can be coupled by a diagonal back-fall H, acting in this case on the 'pull' of the waste pallet of the Swell Pedallier main valve, as described with reference to Fig. 1. In this arrangement the coupling actions of each pedal organ may be moved by pneumatic levers controlled by pneumatic valves, or by my special arrangement for 'wind-coupling,' by which the actuating current passes from pedal pneumatics to manual pneumatics by tubes, without moving the manual action. The pneumatic valves of the stops and couplers of each pedallier are contained in separate wind chests Gk, Ck, and Sk, which are connected by tubes or grooves with the main

valves Ge, Ce, and Se. Thus, the connection opened by any main valve with its separate chest brings into action all stops and couplers having their pneumatic valves open in that chest—all other pedal stops and couplers being thrown off by the closing of their main valves, even though their pneumatic valves be open.

In electric organs, the Helps would work electro-magnets to throw the inappropriate pedalliers out of action by the same current that brings on the one desired, the manual couplers being made to switch the circuits to bring on, instead of throwing off, the pedallier of the coupled manual.

It is not necessary to illustrate the actions for *plenum*, exhaust, or double action pneumatics. They are on precisely the same principle as that of vacuum pneumatics.

The Pedal Organs, especially in divided organs, must be in close contiguity with their manual counterparts.

The Pedal Organ of the Swell must be in the Swell box.<sup>a</sup> The draw-stops of the pedal organs, and the pedal coupling draw-stops must be grouped with and immediately under the draw-stops of their respective manual organs. See stop-grouping in Fig. 17.

Each set of combination actions must act simultaneously upon its respective manual, pedal organ, and pedal coupler. It will then follow that whatever combination be thrown out the pedallier help will bring on the appropriate bass.

<sup>&</sup>lt;sup>a</sup>Messrs. WALCKER & Co. have provided a bass for the Swell of their Boston Organ—the sole instance of which I am aware. It is apparently in the usual inaccessible form.

#### CHAPTER II.

#### COMBINATION ACTION.

COMBINATION movements are of three kinds:-

1. The Composition system, worked by pedals or buttons.

6

- 2. The Ventil system.
- 3. The Fixed Combination system, whereby certain arbitrary combinations are brought 'on' by hitching pedals, irrespective of the draw-stops, which are temporarily superseded by them.

Each of these three systems has peculiar advantages and drawbacks. What these are, we shall perceive if we think out what the modern organist requires. This is in brief how to play upon his stops. He has to play upon them, as well as upon the keys.

This he has to do according to two principal methods. Firstly, in *special* combinations of solo, orchestral, or peculiar character, such as must always be made up by the draw-stops only. Secondly, in *ordinary* combinations of fixed gradations of tone in arbitrary order, from *pp* to *ff*. With the Ventil system we have a third; viz., *deferred* combinations, which do not enter until they are wanted; but are made up beforehand, and are always of a special character.

We thus obtain two classes of combinations, viz.:-

- 1. Special, divided into  $\begin{cases} Present. \\ Deferred. \end{cases}$
- 2. Ordinary.

The Composition system is the best for ordinary combinations. Its drawbacks are, that it breaks up special combinations, which often have to be built up with much hurry and anxiety during a single piece. It requires 'sliders,' which involve heavy and noisy mechanism, and are quite unsuitable for the perpetual changes required by the modern organist. The slider is doomed.

The Ventil is a somewhat primitive device; but it possesses the advantages of silence and extreme simplicity: by it too the deferred combinations are possible, and these are of great value. These deferred combinations may however be required in the very compartment in use, and they can then be got only with much hurried draw-stop manipulation. Broad contrasts of ordinary combinations can be got only with much manipulation, or by having much larger organs than would be necessary with a more comprehensive system.

The Fixed Combination system has the advantage that a few broad contrasts of ordinary combinations may be brought on temporarily, and that under cover of these special combinations may be built up at leisure, to come on when the hitching pedals are released. The drawbacks are serious however; for if a large ordinary combination be required, and not provided for by a special combination pedal, it can be got only by hurried manipulation. In addition to this, the combinations, under cover of which the fresh combinations are to be built up, must be of ordinary character.

All these systems have the serious defect that they do not systematically control the pedal organ, and the manual and pedal couplers.

A system superior to all these would effect the following results.

It would enable us to build up special combinations of manual and pedal stops and couplers for present use.

It would enable us to build up deferred special combinations of the same materials, whether the stops or couplers were in present use or not.

It would enable us to bring on all ordinary combinations of stops, couplers, and pedale, without interfering with the special combinations, whether in present use or deferred.

To effect all these objects, I propose to use the draw-stops, whether sounding or mechanical, for special combinations only—applying means to them for building up the deferred special combinations. The ordinary combinations are all to be relegated to hitching pedals; which, when down, supersede the special combinations, but do not break them up.

Both systems of combination embrace the whole of the

couplers and the pedale; but the pedale combinations, and couplers, remain subject to the Pedallier Helps described in Chapter I.—which are supreme.

I now proceed to describe the draw-stop or special combination system.

The whole of the stops of each manual, together with its corresponding pedal organ, pedal coupler, and such manual couplers as unite other manuals to it, are to be worked pneumatically under the control of a small pedal called a Retaining Pedal:—E.G. The stops of the Great Organ, Great Pedale, 'Great to Pedal,' and 'Swell to Great,' will be under the control of the Great retaining pedal. The object of the retaining pedal is that, when touched, it shall bring on and retain any draw-stop combination that may have been made up. After this has been done, the draw-stops may be freely moved, to form a second or deferred combination; but the deferred combination will not enter until the retaining pedal has been again touched—when it will, in its turn, become fixed, and the stops be free for a third combination. We thus, not only obtain means for making up deferred combinations, but also extend the possibility of doing so over the whole of the stops and couplers, whether in or out of present use.

[Note.—This has been done, so far as the sounding stops are concerned, by Willis, but with different mechanical appliances. I was not aware of this when I invented the system; and the fact seems to show that it is what is wanted, though it must be supplemented. It seems to me to be a much more artistic device than the same builder's composition pistons, and I cannot conceive why it has not come into general use].

It will be seen that a stop may be 'on,' though 'in;' or 'off,' though 'out.' I desire to draw particular attention to these terms. 'In' and 'out' refer to the draw-stops—'on' and 'off' to the results at the sound-board and coupling actions. To use a simple illustration the movement of a stop puts it on 'full cock' for coming 'on' or 'off,' the retaining pedal draws the trigger.

The mechanism of a retaining pedal is shown in Figs. 5,

6, 7, 8. A is the draw-stop, to be firmly 'registered:' to it is to be fixed a spring, B, resting in a slot in the sticker, C. This sticker rests on the end of a backfall, D; by depressing which it raises the pull, E, opening the pallet F, and bringing the stop or coupler 'on.' The retaining action consists of a bar, G, passing under the ends of all the backfalls of any manual and its pedal organ and couplers, and fixed on a rocking shaft. H is the retaining pedal, and its office is to withdraw for a moment the retaining bar from the backfall ends.

On drawing the stop, A, the spring, B, tries to push down the sticker, C; but cannot do so until the retaining bar is moved out of the way (Fig. 6). When this has been done the stop comes 'on,' and the bar at once fixes it (Fig. 7). Pushing the stop in would throw it 'off' (Fig. 8); but the retaining bar will prevent this. On again moving the retaining bar the whole will resume the position in Fig. 5.

We may thus, before commencing to play, make up a given combination— $\alpha$  embracing manuals, pedals, and couplers—and fix it. We may then make up another,  $\beta$ , both with appropriate couplers and pedale; but  $\beta$  will not come 'on' until the pedal is touched.

While playing on  $\beta$ , we may leisurely build up another combination,  $\gamma$ , which will not replace  $\beta$  until the pedal is again touched; and so on ad infinitum.

The retaining pedals are made to hitch down, if required; the stops there work in the ordinary way, subject to the combination pedals.

All couplers work pneumatically through tubes, the valves of which are controlled in exactly the same way as those of the sounding stops, though, as before stated, the pedale couplers still remain subject to the Pedallier Helps.

With a 3 manual organ we may thus start playing with 6 special combinations, and at least 50 or 60 ordinary combinations—the couplers and pedalliers giving no trouble.

If it be thought that the memory would not be sufficient to be trusted as to whether a stop were 'on' or 'off,' it would be easy to fix indices by the draw-stops to show the position. But the memory would soon suffice where the combination movements are systematic, and not a collection of arbitrary 'dodges.'

#### ORDINARY COMBINATIONS.

These progress in well known order:—e. g., the 8 stop Great Organ specified on page 28 would progress thus—

Hohl-flöte.

Ditto + Open Diapason.

Ditto + do. + Principal.

Ditto + do. + do. + Fifteenth.

Ditto + do. + do. + Twelfth.

Ditto + do. + do. + do. + Mixture.

Ditto + do. + do. + do. + do. + do. + Trumpet.

The exception to the usual course is the double stop; which is sometimes required with soft combinations, and frequently not required with loud ones. It must therefore be exceptionally treated.

Any arrangement under my system would bring on simultaneously the appropriate pedale and coupler, subject to the Pedallier Help.

This Great Organ, with its couplers and pedallier, would be under the control of 3 hitching pedals, each having three steps or hitches. The stops would be thus for (say) an 8 stop 'Great.'

- 1. Hohl-flöte, 8 ft., and Open Bass, 16 ft.
- 2. Open Diapason, 8 ft., ,,
- 3. Bourdon, 16 ft., and Bourdon 32 ft.
- 4. Principal, 4 ft., and Principal, 8 ft.
- 5. Fifteenth.
- 6. Twelfth.
- 7. Mixture.
- 8. Trumpet, 8, and Trombone, 16.

The pedals would be thus-









a brings on 1 with pedal coupler, taking off all others, and all manual couplers.

b brings on 1 and 2 c , 1 2 and 3

do. do. do. do. d brings on 1 2 and 4 with pedal coupler, taking off all others, and all manual couplers.

```
      e brings on 1 2 4 5
      do. do.

      f
      1 2 4 5 6
      do. do.

      g
      1 2 4 5 6 7
      do. do.

      h
      1 2 4 5 6 7 8
      do. do.

      j
      1 2 3 4 5 6 7 8
      do. and couples the Swell.
```

The pedals are so arranged that any movement that brings a stop or coupler 'on' will prevail against any that takes 'off.' Thus, though d to h would take 'off' the Bourdon, if 'on,' by the draw-stop, hitch C would add it again.

Similarly, though all the hitches, but j, disconnect the Swell from Great, even if the coupler be on by draw-stop, the coupling pedal K will bring it on again, and enable us to couple the Swell to intermediate ordinary combinations a to h, as the 'on' will again prevail against 'off.'

Three similar pedals would control the Swell with its Pedallier, &c. One or two would probably suffice for the Choir.

These hitching pedals absolutely cancel the draw-stop and retaining actions of their several organs, which are resumed when the pedals are released from their hitches.

In case of one hitching pedal contradicting another, 'on' will prevail against 'off.'

The mechanism is of a very simple character. Circumstances may modify its shape, but the principle is shown in *Figs.* 9 to 13.

In Figs. 5 to 8, it will have been observed that, between the retaining back-fall D and the pneumatic back-fall K, there intervene the spring I, and the tape L. If the stop be retained 'on,' extraneous power may be applied to K to take it off, when the spring I will yield to allow it. If the stop be retained 'off,' K may, nevertheless, be moved to bring it on, when the tape L will hang loose.

On K, and at right angles to it, let there be placed an arm M, and opposite to M an arm N, fixed to a roller O, controlled by a hitching pedal P. If these two arms be connected by a wire tracker, the arm N will always bring the stop 'on' when P is pressed. See Fig. 9.

If on the pull E, and above the tape L, there be a square Q attached to the arm N, then depressing P will take the stop 'off.' See Fig. 10.

Both of these movements are independent of the drawstop and retaining actions,

If M and Q be both attached to N, so as to work simultaneously, the stop will come 'on.' They need not come on simultaneously however; the first movement of N may take the stop 'off,' and a further movement bring it on again. There may be several pedals of the same construction, each of which may thus take certain stops off at the first or second hitch, or bring them on with the 1st, 2nd, or 3rd hitch. See Figs. 11 and 12.

The couplers work under the combination system in exactly the same way as the sounding stops.

These combination movements should always take off such stops as the Voix Célestes, Vox Humana, &c., which belong to the 'special' department.

The leather buttons on the wire trackers, connecting M and Q with N, may be adjusted by the organist for any combinations that he may prefer.

Fig. 19 is a full sized drawing of the aperture in the front panel for a combination pedal of 3 hitches.

English builders will, no doubt, think my disposal of the slider rather summary. WALCKER, of Ludwigsburg, ROOSE-VELT, of New York, WINANS, another American builder, and others, have discarded it for all important work. Several English builders have discarded it as stiff and unmanageable for pedal organs, and the rest is only a matter of time. It was a good and sufficient contrivance when but few changes were required; but for many rapid changes it is unsuitable and unmechanical. Like most archaisms, it will no doubt die hard.

I do not think that an organ, however large, need have more than three manuals. The retaining action would practically convert the three manuals into six solo organs, while the three manual organ effects would still remain open through the combination action. Since the pedal organ ordinary and special combinations would also be instantly available, the combination power of a three manual organ on this system would exceed that of one of nine manuals of the ordinary construction

## CHAPTER III.

#### BORROWED PIPES.

THE Pedal stops being the basses for their manual representatives, it will be seen that the usual stinted pedal organ contains a number of superfluous duplicate pipes:—

E.G., An Open Diapason requires usually 86 pipes; viz., 56 from 8 feet upwards for the manual, and 30 from 16 feet upwards for the pedale. This gives us 18 superfluous pipes from 8 ft. upwards, which would not be missed if mechanism were applied by which one row of 68 pipes from 16 ft. upwards might be played in proper pitch on the manual (8 ft.), or on the Pedale (16 ft.). It may be objected that they would be missed in pedal playing in octaves; but where an ample pedale is provided, it is unnecessary to play in that manner.

There are several methods of making one set of pipes do duty on two or more claviers—the best being that adopted by Walcker, and other good German builders. This plan requires a separate soundboard and pallets for each stop, the slider being superseded by small ventils, which I call stop-ventils. Each borrowed stop requires only a separate sound-board and stop-ventil, with grooves to the original pipes. This simple contrivance is, however, open to the serious draw-back of being difficult of access. I propose, therefore, a new sort of pallet worked by tubular-vacuum action, and possessing the merits of simplicity and facility of access in the highest degree.

This contrivance, which I call a plug-pullet, is illustrated in Figs. 13 and 14. It consists of a slightly tapered turned plug D, bored nearly through longitudinally, and with a shoulder at E. At F. a small circular power-bellows is formed by passing a leather band round the collar at E, and

the top-board G, or in the case of very small pallets by a purse of leather. At H is a spring to press the top-board up, and keep the pallet C closed by the sticker M. This spring may be adjusted by the tapped wire I.

The bottom-board of the soundboard is bored through from front to back (K to K), the plug D being perforated and notched to allow a free passage into it, and on beyond to the next sound-board and same note of another stop. Each pallet will require 3 guiding pins O O turned outwards to facilitate insertion. The plug may be held in its place by a tapped wire N, or it may have a screw cut on it. The whole pallet may thus be adjusted, removed, or replaced without removing anything else.

Application of vacuum wind to K K will pull down the pallet C, admitting wind to the pipe A.

The stop-ventils may be of the same form; but in the case of large stops they had better be in equilibrium shape. The wind trunks might run across the ends of the sound-boards, and the stop-ventils work horizontally.

To borrow a stop, it will be necessary to provide a second soundboard P, with plug-pallet Q Q, and with a groove-board R. The next vacuum-bearing groove to K K will be that of the borrowed note. Thus, if A were the 8 ft. pipe of the Open Diapason, 8 ft., on the manual, the next groove to K K would be that of the centre C of the Pedale Open Diapason (16 ft.)—P being the Pedale Open Diapason sound-board.

Show pipes would not be conveyanced; they would stand almost immediately over their wind, the tubes being taken to the plug pallets. Figs. 15a and 15b.

Large pipes, which it may be desirable to put on the floor, can be arranged with horizontal valves.

The system of borrowing may be applied to one manual from another. An extreme illustration is given in the APPRINDIX, of an organ in which a large and effective Choir Organ is, with its pedale basses, taken almost entirely from the Swell.

The system is applicable to places where a large organ is in comtemplation, but cannot at first be afforded. No

'preparations' are required but room and wind. Sound-boards and pallets may, with their pipes, be added afterwards. It is also especially applicable to the conversion of old long-manual organs, for none of the old pipes (which would often be of fine tone) need be discarded, or be spoiled by being cut down to enlarge the scale.

Since it would no longer be necessary to have horizontal soundboards, the upper pipes, say from 3 ft. upwards, might be disposed as in *Fig.* 16, saving a great deal of room.

It would facilitate the use of varying pressures of wind.

It might be applied to the acoustic toys, called 'Enharmonic Organs.'

If it were considered advisable to have a large scale Open Diapason on the Pedale (Major Bass), a Principal (8 ft.), and even a 15th (4 ft.), might be borrowed from it by sound-boards and pallets—the tubes being turned up an octave, or two octaves.

All this would cost money—but the Organ would have Pneumatic action, and a large and varied Pedale. Except for the manual coupling actions, all roller-boards, back-falls, &c., would be abolished; and in any case we should have got rid of sliders, bearers, &c., together with 18 pipes per Pedale stop.

As one eminent English builder has stated that probably the sound of the pipes would sometimes be missing, it may be well to state that after I designed the sound-board and pallet I sent the plan to Mr. Roosevelt, who informed me that the former is identical in principle with the pneumatic soundboard used by him for some years, and that the pallet is almost identical with one successfully used by another American builder, Mr. Winans. Mr. Roosevelt's sound-board will be fully shown in the forthcoming work by Mr. G. A. Audsley, of Liverpool.

It has been objected, that I save only the comparatively cheap upper octave and a half of the pedal pipes, leaving still the costly bottom octave, for which room and money must be provided. The objection seems unreasonable, for it is in any case impossible to dispense with the bottom pipes. I have not suggested the addition of one unnecessary

stop; but the saving is by no means to be despised, if the pipes are of good stuff. As to the saving in room, I think that, combined with judicious division of the organ, it would save many a fine Church from the costly, unmusical, and too often unsightly Organ Chamber. Organ Chambers are costly, not only in themselves, but they smother a large portion of the tone, and spoil the remainder. dispensed with, smaller organs would suffice. The organ of some 1,550 pipes specified in the APPENDIX, if corbelled out on both sides of a large chancel, or the eastern bays of a nave, would do more than any organ of 50 stops and 3,000 pipes in a chamber. The division might take the form of Chancel and West End Organs-the former consisting of a Choir Organ of one or two manuals, and the latter of large Great and Swell Organs; each manual having, of course, a proper pedallier—the whole being played from one console.

These arrangements would give architects a chance of dealing effectively with what is now generally an eyesore, and would, it is to be devoutly hoped, abolish for ever the miserable packing box surmounted by a row of bedizened lollipops, and called an organ case. If an organ is not worthy of a good case it is not worth anything.

## NOTE ON THE PEDAL BOARD.

The College of Organists recommend O under O for this, yet express a wish for 8 and 4 ft. stops on the pedale 'for melodic use.' This is inconsistent. If stops be added for melodic use, they should run up to the highest usual notes of the Soprano and Tenor; viz., A—a compass easily attainable by having D under D, or even E under E. The gauge might well be lessened by  $\frac{1}{16}$  of an inch between the natural centres. See Fig. 17.

The organ specified in the APPENDIX contains pedale solo stops 'for melodic use,' having a Violoncello of 8 feet, and a Clarionet and Clarion of 4 ft. for this purpose. The separate pedalliers are essential to this practice. Without it, the melodic stops would be almost impossible to manipulate.

It is worthy of note that the organ at Kronstadt, built in

1839, has a pedal organ of 17 stops from C C to Fid. G, 32 notes. This is also the compass specified by Mr. Best in his Organ Book (Boosey & Co.).

## NOTE ON THE TREMULANT.

The pathetic vibrato of a good tremulant, when applied to soft beating-reeds, has led to widespread abuse. In common with the 'Voix Célestes,' it requires very careful and rare use.

The best way will be to put a small pedal on the Swell pedal itself, to move up and down with and hitch upon it, but not to come into action unless actually touched. This can easily be done by proper centreing, and the vibrato will then be available for tasteful and natural use. See Fig. 18.

Instead of using this double pedal for the tremulant, it might be used for two separate swells in the same organ. These could then be used in 'similar, oblique, or contrary motions' of expression, by one foot.

# APPENDIX.

Specification of a divided Organ of 37 'Stops' (i.e. 24 stops, and 13 pedal basses) to be played from a Console in the Chancel.

## NORTH ORGAN.

Consisting of the Great Organ, Great Pedallier, and appropriate Couplers; the Stop and Coupling Knobs and Combination actions on the treble side.

# GREAT ORGAN. C C to C 4, 5 Octaves.

1.	Bourdon.	16 feet tone.	61	nines.
ı,	Domaon,	TO TOOL NOTION	VΙ	DIDGO.

- 2. Open Diapason, 8 ft. 61
- 3. Hohl-flöte,
- 4. Principal, 4 ft. 61
- 5. Twelfth. 2# ft. 61
- 6. Fifteenth, 2 ft. 61
- 7. Mixture. III ranks 183
- " two top octaves harmonic 8. Trumpet, 8 ft. 61

610

# GREAT PEDALLIER. CCC to A., 34 Notes.

- 9. Bourdon 32 feet tone, 12 pipes, remainder from No. 1.
- 10. Open Diapason, 16 ft. 12
- 8 ft., 11. Principal 12 4. ,, ,,
- ,, 12. Trombone, 16 ft. 12 8.

48

#### ACCESSORIES.

- I. Coupler Great to Great Pedallier.
- Swell Pedallier to Great Pedallier. II.
- III. to Great.
- IV., V., VI. Combination Pedals acting on Great and Great Pedallier.
  - VII. Combination Pedal acting on II. and III. simultaneously.
    - VIII. Retaining Pedal.
      - IX. Pedallier Help, under Great Manual.

### SOUTH ORGAN.

## Consisting of the Swell and Choir Organs, with their Pedalliers, viz.—

## SWELL ORGAN. CC to c + with extra top Octave.

13. Bourdon, 16 feet tone, 73 pipes, metal treble.	
14. Viol da Gamba, 8 ft. 73 ,,	
15. Flûte Harmonique, 8 ft. 73 ,, Stopped bass.	
16. Voix Célestes, 8 ft. 61 ,, (tenor C.)	
17. Spitzflöte, 4 ft. 73 ,,	
18. Mixture, II. ranks 146 ,,	
19. Double Hautboy, 16 ft. 73 ,, top Octave harm	
20. Cornopean, 8 ft. 73 ,, two top Octave monic.	s har-
21. Corno di Bassetto, 8 ft. 73 " ditto do.	
718	

#### SWELL PEDALLIER.

22. Sub-bass,	16 feet tone,	12	pipes,	remainder	from N	o. 15.
(Or Violone,	16 ft.	12	29	,,	,,	14.)
23. Quint	10% ft. tone,	12	,,	"	"	13.
24. Contrafagotto,	32 ,,	12	,,	,,	**	19.
(These 12 pip	es of ½ lengtl	h m	itred t	to 8 feet he	ight.)	
25. Euphonium,	16 ft.	12	pipes,	remainder	from N	lo. 20.
		48		•		

#### ACCESSORIES.

X. Coupler, Swell to Swell Pedallier. XI. Ditto Swell in octaves (up.)

XII., XIII., XIV. Three Combination Pedals.

XV. Retaining Pedal. XVI. Pedallier Help, under Swell Manual.

The Stop and Coupler knobs and Combination actions on the Bass side.

## CHOIR ORGAN. C C to C4.

The whole with its Pedallier in the Swell box, except the Dulciana, which is to form the front.

26. Dulciana,	8	feet,	61	pipes.			
27. Gedeckt,	8	ft.	0	pipes,	entirely :	from No.	13.
28. Viola,	4	ft.	0	,,	,,	"	14.
29. Flûte Harmonique,	4	ft.	0	"	"	,,	15.
30. Spitzflöte,	2	ft.	0	,,	"	,,	17.
31. Hautboy,	8	ft.	0	"	,,	,,	19.
32. Vox Humana,	8	ft.	61	pipes,	top octav	re harmo	niç.
			129	2	•		

#### CHOIR PEDALLIER.

33.	Gedeckt,	16	feet,	tone,	0	pipes,	entirely	from	No.	13.
34.	Violoncello,	8	ft.		0	"	"		,,	14.
35.	Bassoon,	16	ft.		0	29	"		99	19.
36.	Clarion,	4	ft.		0	22	"		,,	20.
37.	Clarionet,	4	ft.		0	"	"		;,	21.

## ACCESSORIES.

XVII. Coupler, Choir to Choir Pedallier.

XVIII., XIX. Two Combination pedals.

XX. Retaining pedal.

XXI. Pedallier Help, under Choir Manual.

The Stop and Coupler knobs above the Swell Manual, the Combination actions in centre of console.

#### GENERAL ACCESSORIES.

XXII. Swell pedal.

XXIII. Tremulant to 21, 31, 32, and 37.

The Console, with the Stop-grouping, is shown in Figs. 17 and 18.

## SUMMARY OF STOPS AND PIPES.

```
8 Stops, 610 pipes.
Great Organ
  " Pedallier
                                 48
                       9
                                718
Swell Organ
                                     ,,
                           11
  " Pedallier
                                 48
                           "
Choir Organ
                       7
                                122
  " Pedallier
                       5
                      37
                              1.546
```

#### SIZE OF PEDAL PIPES.

The 13 Pedal Stops require 96 separate pipes, viz .:-

```
12 Wood Pipes, from 16 feet length, for 32 feet, Great Pedallier
12 Wood or metal,
                       16
                                           16
                                 ,,
                         8
                                            8
12
     ,,
                                 "
                                                    ,,
                                           16 ft. tone, Swell ,,
                         8
12
                                 "
                         5\frac{1}{3}
                                           103
                                                       Swell "
12
36 Reed Pipes, in 3 sets, each from
                                          16 feet length.
96
```

An independent Great Bass 16 feet, and Great Principal 8 feet, would require 22 pipes more, from 4 feet upwards.

#### SUMMARY UNDER ORDINARY CONSTRUCTION.

Great Organ	•••	8	Stop	s, 610 p	oipes
,, Pedallier	•••	4	,,	114	,,
Swell Organ	•••	9	"	718	,,
" Pedallier	•••	4	,,	136	,,
Choir Organ	•••	7	,,	427	,,
,, Pedallier	•••	5	"	170	,,
1		37		2,175	
		=			

The freedom with which the pedal couplers may be used obviates the necessity for many 8 feet pedal stops for chorus purposes; but they should be supplied for solo playing.

In the next specification it is supposed that only 8 feet height is available for the Swell and Choir.

;

# TYPICAL DESIGN FOR

Of 52 Stops and 28 Pedal Basses,

## SWELL ORGAN.

ECHO.

Orchestral Hautboy, 8 ft.

Vox Humana, 8 ft. Voix Célestes, 8 ft. Viol da Gamba, 8 ft.

REEDS.

Clarion, 4 ft. Harmonic Trumpet, 8 ft. Contra Fagotto, 16 ft.

OCTAVES AND CHORUS.

Mixture, VII. Rks. Fifteenth, 2 ft. Flauto Traverso, 4 ft.

Principal,

DIAPASONS.

Stopped Diapason, 8 ft. Open Diapason, 8 ft.

Bourdon, 16 ft.

#### SWELL PEDALLIER.

OCTAVES & REEDS.

Trumpet, 8 ft. Trombone, 16 ft. Contra Fagotto, 32 ft. Principal, 8 ft.

UNISONS & DOUBLES.

Sub-bass, 16 ft. Acoustic Bass, 32 ft. Swell to Pedal.

#### CHOIR ORGAN.

CHORUS AND REEDS (Reeds in Swell).

Corno di Bassetto, 8 ft. Hautboy, 8 ft. (i.e. Organ Hautboy.) Orchestral
Bassoon, 16 ft.
to A below
tenor C Key.

Mixture III. (or Echo Cornet, V.)

OCTAVES.

Piccolo,

Lieblich Flöte, 4 ft.

Viola, 4 ft.

SOFT EIGHT FEET.

Keraulophon, 8 ft. SOFT El Vienna Flute, 8 ft.

Dulciana,

Vox Angelica, 8 ft.

DIAPASONS.

Stopped Diapason, 8 ft. Open Diapason, 8 ft. Lieblich Gedeckt, 16 ft.

#### CHOIR PEDALLIER.

REEDS (In Swell).

Clarionet, 4 ft. Hautboy, Orchestral 4 ft. Bassoon, 8ft.

Bassoon, 16 ft.

DIAPASONS.

Violoncello, 8\_ft. Gedeckt, 16 ft. Choir to

# A CATHEDRAL ORGAN,

showing the Stop-grouping.

#### GREAT ORGAN.

REEDS.

Double Trumpet, 16 ft. Trumpet, 8 ft. Tuba, 8 ft. Clarion,

CHORUS.

Cornet, IV. Rks. Full Mixture, VI. Rks. Sharp Mixture, VII. Rks.

OCTAVES.

Principal, 4 ft. Gemshorn, Fifteenth, 2 ft.

Spitz-flöte, 2 ft.

MUTATION.

Quint, Ši ft. Twelfth, 23 ft. Tierce, 3<sup>1</sup> ft.

DIAPASONS.

1st Open Diapason, 8 ft. 2nd Open Diapason, 8 ft. Bell Diapason, 8 ft. Harmonic Diapason, 8 ft.

al. R

Salicional, 8 ft. POSITIF. Rohr-flöte, 8 ft.

Harmonic Flute,

DOUBLES.

Swell to Great.

Quintatön, 32 ft. Open Diapason, 16 ft. Bourdon, 16 ft.

#### GREAT PEDALLIER.

Posaune, 32 ft. REEDS. Tuba Magna, 16 ft.

Trumpet, 8 ft.

MUTATION AND CHORUS.

Quint, 10% ft. Tierce, 6<sup>3</sup> ft.

Full Mixture, VI. Rks. Sharp Mixture, VII Rks.

Principal, 8 ft. OCTAVES. Gemshorn, 8 ft.

Fifteenth,

UNISONS.

Great Bass, 16 ft. Open Diapason, 16 ft. Violone, 16 ft. Stopped Diapason, 16 ft.

DOUBLES.

Great to Pedal. Acoustic Bass, 64 ft. Open Diapason, 32 ft.

## DISPOSITION OF ORGAN.

North	Organ	•••	•••	Great and Great Pedallier.
South	do.	•••	•••	Swell and Swell do.
Soreen	do.	•••	•••	Choir and Choir do.

# ACCESSORY REGISTERS, &c.,

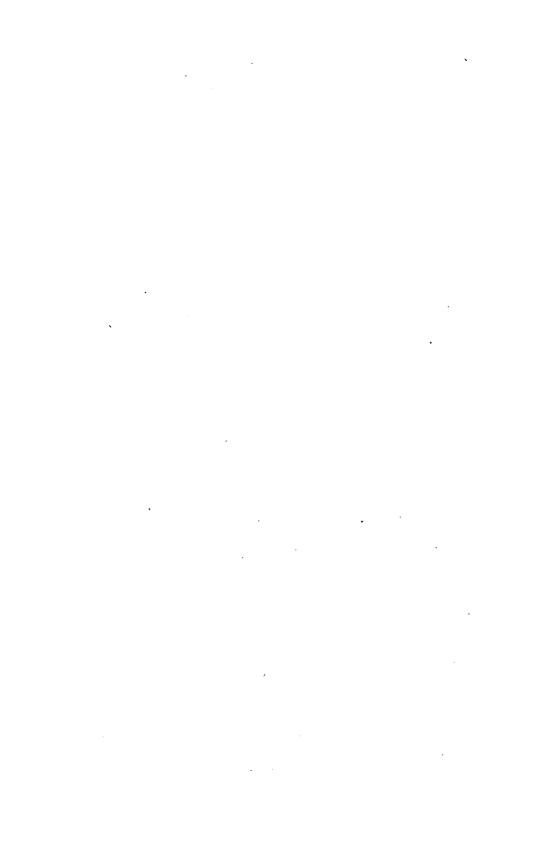
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## CATHEDRAL ORGAN.

do.

- 4 Couplers.
- 3 Retaining pedals.
- 5 Combination pedals, Great and Great Pedallier.
- ditto Swell and Swell
- · 3 ditto Choir and Choir do.
  - 1 Tremulant to Echo Reeds.
  - 3 Pedallier Helps.
- 23 Accessories.

It will be perceived that these accessories are ample to give complete control over the whole organ, including the Pedal Stops and Couplers.



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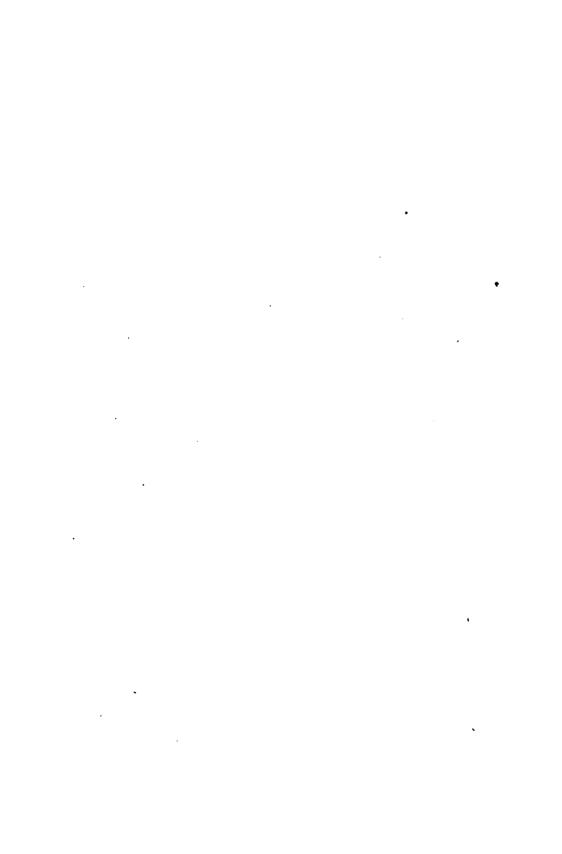
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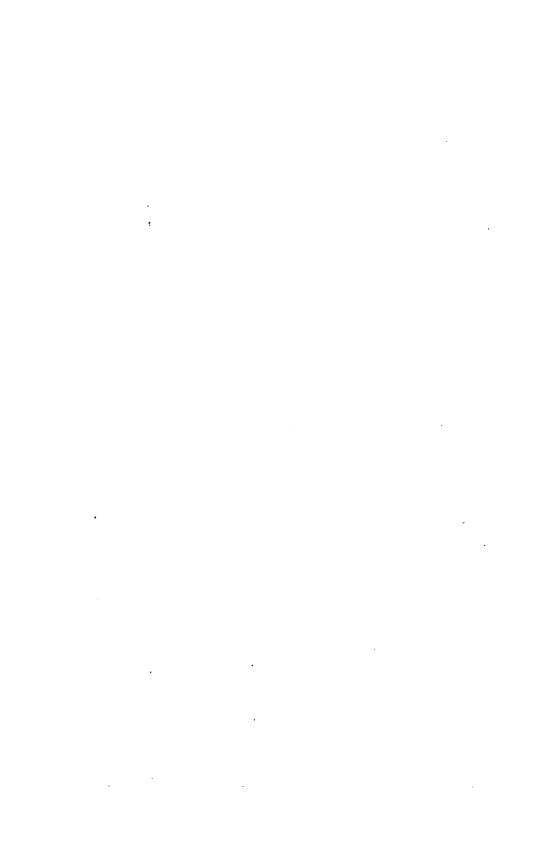
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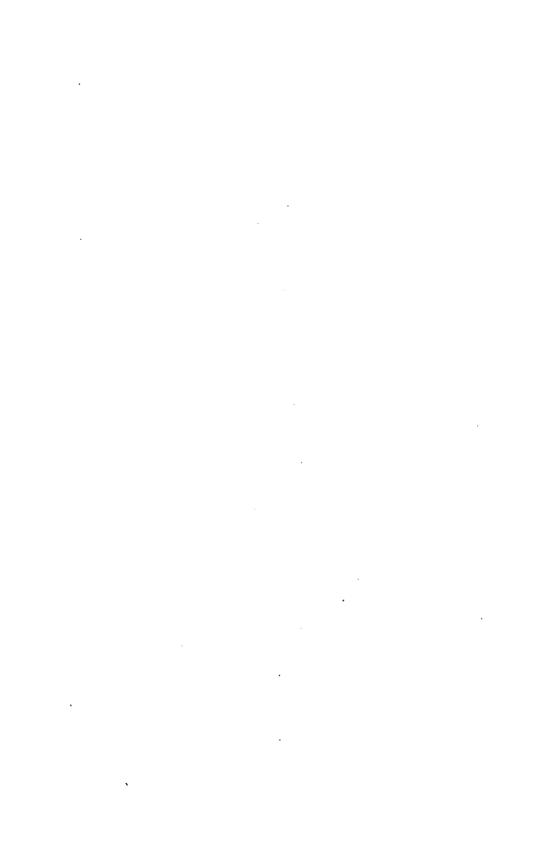
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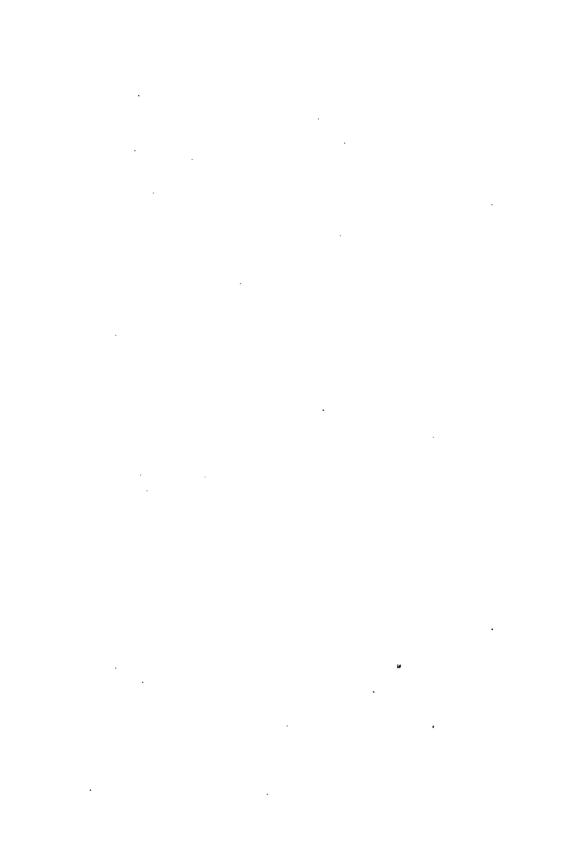




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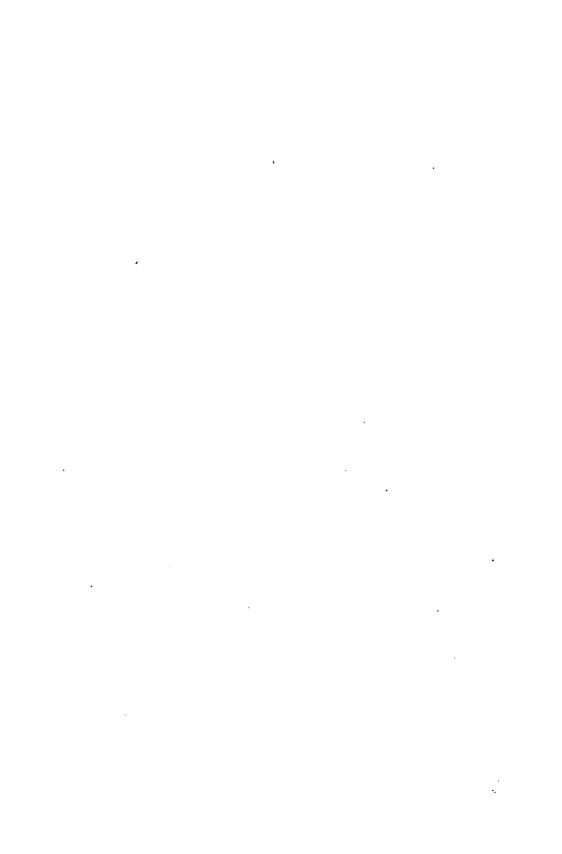










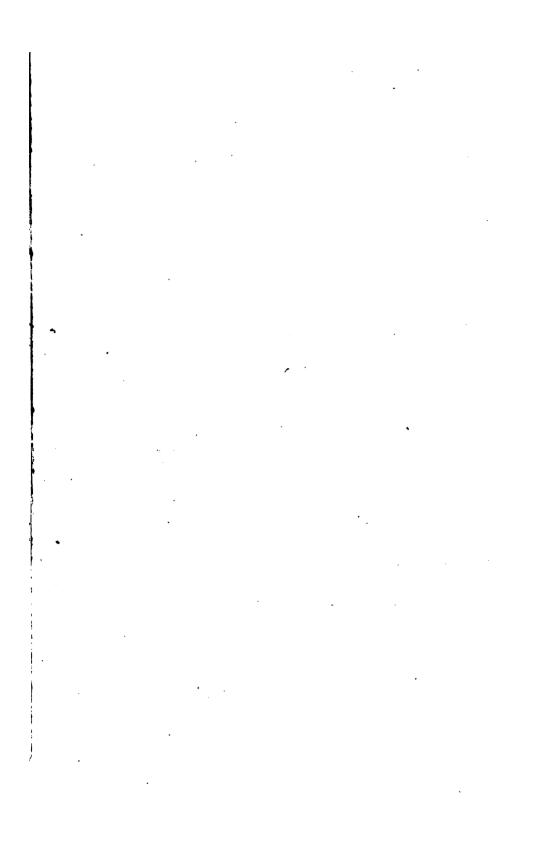


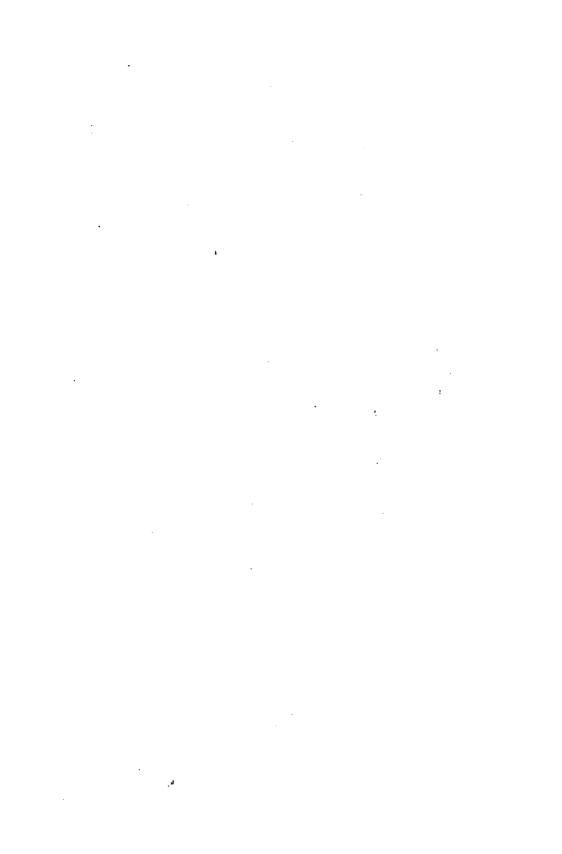




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